

1. An apparatus for use in measuring fluid levels in a container comprising:

a sensor head; and

5 a sensor rod attached to the sensor head, the rod being comprised of a plurality of rod sections, the rod sections having an outer surface, the rod sections adapted to be connected together.

2.           The apparatus of claim 1 wherein the sensor head is a microwave transceiver.
3.           The apparatus of claim 1 wherein the rod is a waveguide.
4.           The apparatus of claim 1 wherein the rod sections screw together.
- 5   5.           The apparatus of claim 1 wherein the outer surface of the rod sections are circular.
6.           The apparatus of claim 1 wherein at least a portion of the outer surface of the rod sections is generally flat.
7.           The apparatus of claim 1 wherein at least a portion of the outer  
10 surface of the rod sections are hexagonal.
8.           The apparatus of claim 1 wherein at least one rod section is curved.
9.           The apparatus of claim 1 further comprising a head flange attached to the head, the head flange adapted to be connected to a corresponding container flange attached to the container.
- 15 10.           The apparatus of claim 9 further comprising a tamper-proof restraint attached to the head flange, wherein the tamper-proof restraint must be removed before the head can be removed from the head flange.

11. The apparatus of claim 1 further comprising:  
a tube surrounding the rod, the tube having an inner surface, the tube being comprises of a plurality of tube sections, the tube sections adapted to be connected together; and
- 5 a plurality of circumferentially and longitudinally spaced slots in the tube.
12. The apparatus of claim 11 wherein the rod sections are adapted to be connected together and disconnected and inserted and removed from the tube without disconnecting the tube sections and regardless of the fluid levels in the
- 10 container.
13. The apparatus of claim 11 wherein the tube sections are connected together with a plurality of fasteners.
14. The apparatus of claim 11 wherein at least one tube section is curved.
- 15 15. The apparatus of claim 11 wherein the slots are positioned on the tube so as to allow fluid equalization within the tube.
16. The apparatus of claim 11 further comprising a plurality of spacers attached to the rod, the plurality of spacers adapted to generally radially center the rod within the tube.

17. The apparatus of claim 16 wherein the rod has a plurality of spaced notches, the notches adapted to receive the spacers and prevent the spacers from longitudinally moving along the rod.

18. The apparatus of claim 16 wherein the spacers have a plurality of  
5 radial extensions, the radial extensions adapted to not penetrate the slots in the tube.

19. The apparatus of claim 17 wherein at least one radial extension has a width wider than the width of the slots in the tube.

20. An apparatus for use in measuring fluid levels in a container comprising:

a microwave transceiver sensor head;

a head flange attached to the head, the head flange adapted to be  
5 connected to a corresponding container flange attached to the container;

a tamper-proof restraint attached to the head flange, wherein the  
tamper-proof restraint must be removed before the head can be removed from the  
head flange;

a waveguide sensor rod attached to the head, the rod being  
10 comprised of a plurality of rod sections, the rod sections having an outer surface  
wherein at least a portion of the outer surface is hexagonal, the rod sections  
adapted to be screwed together, the rod has a plurality of spaced radial notches;

a gauge tube surrounding the rod, the tube having an inside surface,  
the tube being comprised of a plurality of gauge tube sections, the tube sections  
15 adapted to be connected together with a plurality of fasteners;

a plurality of circumferentially and longitudinally spaced slots in the  
tube, the slots positioned so as to allow fluid equalization within the tube; and

a plurality of spacers attached to the notches in the rod, the plurality  
of spacers adapted to generally radially center the rod within the tube, the notches  
20 adapted to prevent the spacers from longitudinally moving along the rod, the  
spacers having a plurality of radial extensions, the radial extensions having a width  
wider than the width of the slots in the tube whereby the radial extensions do not  
penetrate the slots in the tube.

21. The apparatus of claim 20 wherein at least one rod section and at least one tube section are curved.

22. A method for installing an apparatus for use in measuring fluid levels in a container comprising:

connecting slotted gauge tube sections together with a plurality of fasteners;

5 inserting waveguide sensor rod sections into the tube sections;

screwing the rod sections together; and

attaching a microwave transceiver sensor head to one of the sections of the rod.

23. The method of claim 22 further comprising:  
bolting a head flange to a corresponding container flange; and  
screwing the head into the head flange.
24. The method of claim 23 further comprising attaching a tamper-proof  
5 restraint to the head flange.



25. A method for cleaning an apparatus for use in measuring fluid levels in a container comprising:

removing waveguide sensor rod sections from a gauge tube;

unscrewing the rod sections;

5 cleaning the rod sections;

inserting the rod sections into the tube; and

screwing the rod sections together.

26. The method of claim 25 further comprising:
- inserting a cleaner into the tube; and
- cleaning the tube with the cleaner; and